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USING INTERNATIONAL TRADE DATA FOR EVALUATING THE PRODUCT SPECIFIC COMPETITIVENESS AND SUPPLIED PRODUCT QUALITY OF COUNTRIES A Successful Example of Applied Theory

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This paper proposes a simple regression-based method for reducing the complexity of decisions in the international procurement process. Based on foreign trade data, the method uses indicators, which allow a product specific cross-section and longitudinal-section valuation of the international competitiveness and the supplied product quality of all potential supplier countries. The method thus provides a variety of information for procurement departments, including the present level and the dynamic of competitiveness and product quality for the potential supplier countries within every product group of the international product nomenclature (Combined System and the Harmonised System). Potential supplier countries --the companies of which have proven to be particularly competitive in the different product quality stages-- are identified. This pre-selection of countries enables the companies to limit their search for potential suppliers to the selected supplier countries. High search costs are subsequently reduced and trend prognoses can be constructed.

Keywords: international trade; competitiveness of nations; product quality; procurement process; supply chain

Introduction

The internationalization of economy has prompted companies to spatially expand their procurement activities. As a result the number of potential suppliers and the complexity of optimizing the procurement process in the view of cost and quality advantages grow (Hesselberger 1997). Global sourcing does not solely aim at providing material requirements but also at integrating international suppliers into the quality management process itself. In this manner, technological advancement designed abroad can be integrated much faster into own process and product development. Global sourcing is therefore not only an instrument of procurement policies but also an instrument of corporate strategy (Rosenwald 1998; Anders 1992).

How can the most competitive suppliers in international procurement markets be identified? This question arises in particular for those companies, which are at the beginning of an internationalization of their procurement activities and therefore have very little international experience. Such companies face a variety of options that they often cannot counter with their traditional knowledge and procurement processes. Even internationally experienced companies are forced into constantly checking the competitiveness and product quality of their suppliers in order to develop their own product and cost leadership.

The formulation of selection criteria for supplier firms inevitably leads

to factors sufficiently discussed in literatures, which influence the decision for supplier companies (Levy 1993; Piontek 1994; Piontek 1997):

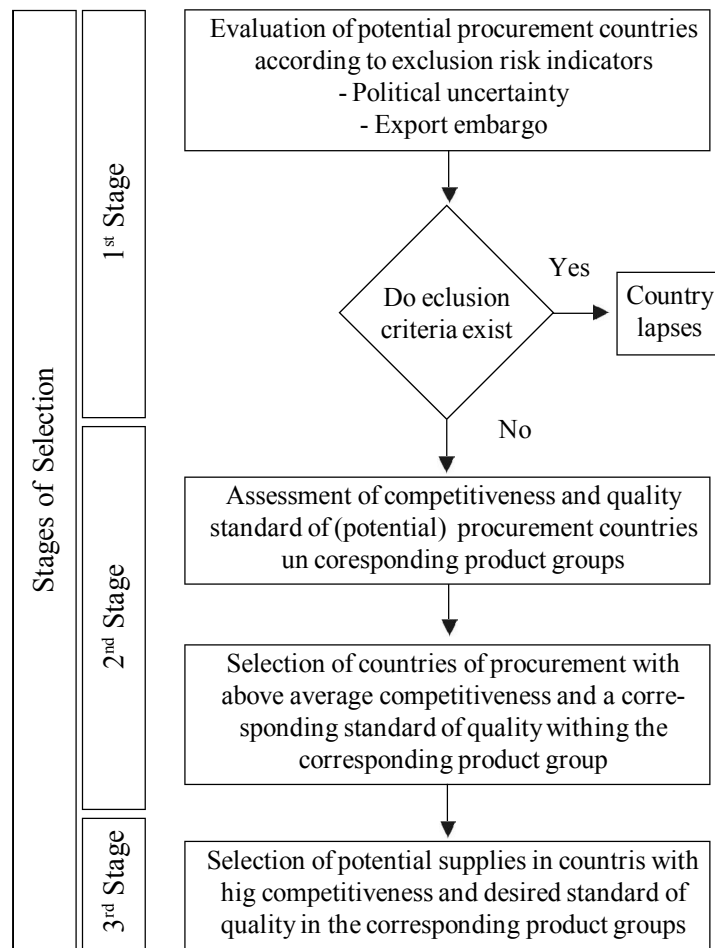
1. Suppliers are supposed to improve the innovation capacity of the company being supplied. This occurs through the adoption of new technologies by the supplier and the diffusion of these technologies within the buyer's product. The extensive form of this technology transfer consists of the concerted development of new technologies in the form of joint ventures etc.
2. The products supplied should be related to one another in an optimal ratio of price and quality.
3. The deciding criterion also includes the question of whether the supplier is capable of supplying the necessary quality in an adequate number of units over a longer period of time. In the process, the crucial influence not only involves corresponding production capacities but also the economic and political stability in the supply country where the production site is located.

If a purchaser is familiar with some suppliers, evaluation criteria can be formulated with the help of traditional business management instruments of the supplier analysis (Koppelman 1998). A systematic approach, however, presumes a corresponding selection on a higher aggregated level of national data. The demand for a methodical procedure calls for an analysis set at a highly-aggregated level of

macroeconomic, country risk or international trade data where, initially, each country in the world can be taken into consideration as a potential supply country (Koppelman 1998). With the help of national competitiveness and quality criteria, the individual supplying countries –and consequently their companies –can be filtered step

by step as described in Figure 1. That often leads to an enormous reduction of potential supplier countries and in consequence to a reduction of potential supplier firms. After that reduction one must leave aside the national level of analysis in order to be able to integrate into the decision process information on individual companies.

Figure 1. **Procedure of the Procurement Process**



Source: Cleff (2005) in *Interdisciplinary Management Research* edited by D. Barkovic and B. Runzheimer.

In practice, empirical methods for evaluating the competitiveness of supplier countries hardly exist and large gaps appear in empirical literature, which should be filled at this point. First of all, factors that must be taken into account are often regarded as being too complex. Such methods seem to be inferior with regard to their general comprehensibility of an “intuitive and entrepreneurial” approach, leading to the fact that a systematic application of such methods has not been pushed ahead.

International Risks

Indicators for the evaluation of “country risks” are of high possibility to be the first selection criteria for potential supplier countries (Rosenwald 1998). A considerable number of indicators make efforts to record these risks, like for example the “Beri-Index” or the “Country Risk Classification of the Participants to the Arrangement on Officially Supported Export Credits” of the OECD. Which of these many risk indicators that may be adequate for a company depends on the company activity abroad. Export business and international sourcing simply require an evaluation of the business climate and political risk, whereas the risk of a failing transfer of gain should be evaluated in case of direct investments.

Despite the differing goals of the commercial risk indicators, one can detect remarkably high correlations amongst the different indices more

than 90 percent (Pearson $r > 0.9$). The Institutional Investor Country Credit Rating (IIR) of March 1998 and the index developed by the German insurance company HERMES, for example, correlate with a coefficient of $r = 0.93$. In 1996, the BERI-Index and the IIR-Index of March 1996 correlated with $r = 0.92$. Even the individual sub-indices of the BERI-Index (ORI, PRI and r96) correlate with the IIR-Index to the same high extent. Therefore, a risk evaluation of potential supplier countries can easily be limited to one risk index. Which risk level or level of political and economic instability that may be considered tolerable depends on the respective purchasing strategy of the company (Corsten 1992; Kreikebaum 1997). Countries with excessive risk indicators should be excluded from further analysis.

In general, this limitation scarcely leads to a significant reduction of potential supplier countries, particularly since the sorting-out affects countries with lower industrial production almost exclusively. That explains why the below described method uses economic indicators, which allow a product specific cross-section and longitudinal-section valuation of the international competitiveness and the supplied product quality of all potential supplier countries. The method provides a variety of information for procurement departments, including the present level and the dynamic of competitiveness and product quality for the potential supplier countries within every product group of the interna-

tional product nomenclature –the OECDs Combined System or the European Harmonized System. Potential supplier countries –the companies of which have proven to be particularly competitive in the different product quality stages–are identified. This pre-selection of countries enables the companies to limit their search for potential suppliers to the small number of selected supplier countries. High search costs are subsequently reduced. Trend prognosis can be constructed as well. Potential supplier countries, which have not yet reached a certain quality standard or certain competitiveness, but have caught up strongly during recent years, can be observed sensitively. At the same time, the opposite (negative) trend can be used as an early warning system.

Supplied Product Quality

When trading homogenous goods –that means products out of the same product class of the international product nomenclature price differences can be led back to differences in quality. Accordingly, the ratio of the value and the quantity of the goods traded is a measure of quality, known as the “Unit Value” (UV). A high Unit Value indicates higher quality; a lower Unit Value a lower one (Aw 1988).

The question of interest not only consists of the country-specific level of the Unit Value in the previous year and its deviation from the average value of all countries. The type of development the *UV* of a country has endured

over the entire period compared to the average of all countries should be considered. For this reason the *UV* of the individual years are calculated from international trade databases and put into a linear context by using simple *OLS* regressions.

Given the dataset where all available bivariate trade flows are included. The variable UV_{tik} corresponds to the product-specific Unit Value for supplier country k ($k=1, \dots, n$) trading with the supplied country i ($i=1, \dots, m$) for all $i \square k$. The variable t represents the time index of the observed year ($t = \text{year}$). The derived variable *year_inv* results from subtracting the maximum of the time index of the observation period ($\max(t)$) from each time index t [$\text{year_inv} = \text{year} - \max(t)$]. A value of $t=0$ thus comes out for the observations of the previous survey year, a value of $t=-1$ for the survey year preceding the last year of survey etc. The variable e_{tik} represents the error term and g the constant of the regression. The regression reg^j is estimated separately for each potential supplier country j ($j \square \{k=1, \dots, n\}$). Nevertheless, each regression reg^j includes all available bivariate trade data between every supplier countries ($k=1, \dots, n$) and all supplied countries ($i=1, \dots, m$).

$$\begin{aligned} reg^j: UV_{tik}^j &= \gamma^j + \alpha^j * \text{supp}_{tik}^j + \\ &\quad \beta^j * \text{supp_trd}_{tik}^j + \\ &\quad \delta^j * \text{year_inv}_t^j + \varepsilon_{tik}^j \\ \text{supp}_{tik}^j &= \begin{cases} 1, & \text{if } k=j \\ 0, & \text{otherwise} \end{cases} \\ \text{supp_trd}_{tik}^j &= \text{year_inv}_t^j * \text{supp}_{tik}^j \end{aligned}$$

The predicted UV can be ascertained for the previous survey year $[\max(t)]$ over all supplier countries. It corresponds to the constant (γ^j) of the regression. How far an individual supplying country j ($j \in \{k=1, \dots, n\}$) exactly deviates from the annual average UV in the final survey year can be identified from the respective coefficient α^j . The estimated UV of a particular supplier country for the last survey year is obtained by adding the constant with the coefficient α^j for the respective country j . The estimated annual average product quality of a supplier country j for the final survey year lies above the total annual average of all countries, if the corresponding coefficient α^j demonstrates a positive coefficient with a level of significance commonly applied amongst statisticians of less than five percent [$P(\alpha^j) < 0.05$]. Accordingly, the estimated annual average product quality of a country j for the final survey year lies below the total annual average if the coefficient α^j is negative with a level of significance of less than five percent [$P(\alpha^j) < 0.05$]. In all other cases, the estimated annual average product quality of a supplier country lies within the total annual average of all countries for the previous survey year.

The development, which the estimated product quality takes over the whole period, can be read from the slope δ^j . If δ^j is significantly positive, then the Unit Value generally increases for all countries. In the opposite case, where δ^j is significantly negative, the

corresponding UV decreases over the time. With the help of coefficient β^j the trend of the individual supplier country j can be put into comparison with the annual average trend of all countries. The estimated trend of the UV of the country j increases more or decreases less over time if the corresponding coefficient β^j takes on a positive value and the level of significance turns out to be smaller than five percent [$P(\beta^j) < 0.05$]. The estimated trend of the UV of a supplying country j , on the other hand, increases less or decreases more over time if β^j assumes a negative value and the level of significance is smaller than five percent [$P(\beta^j) < 0.05$]. In all other cases the trend of the UV of a country j develops within the annual average of all countries.

You have to keep in mind the requirements for testing the classical assumptions of linear regression models as well. Data should not be heteroscedastic, autocorrelated or multicollinear:

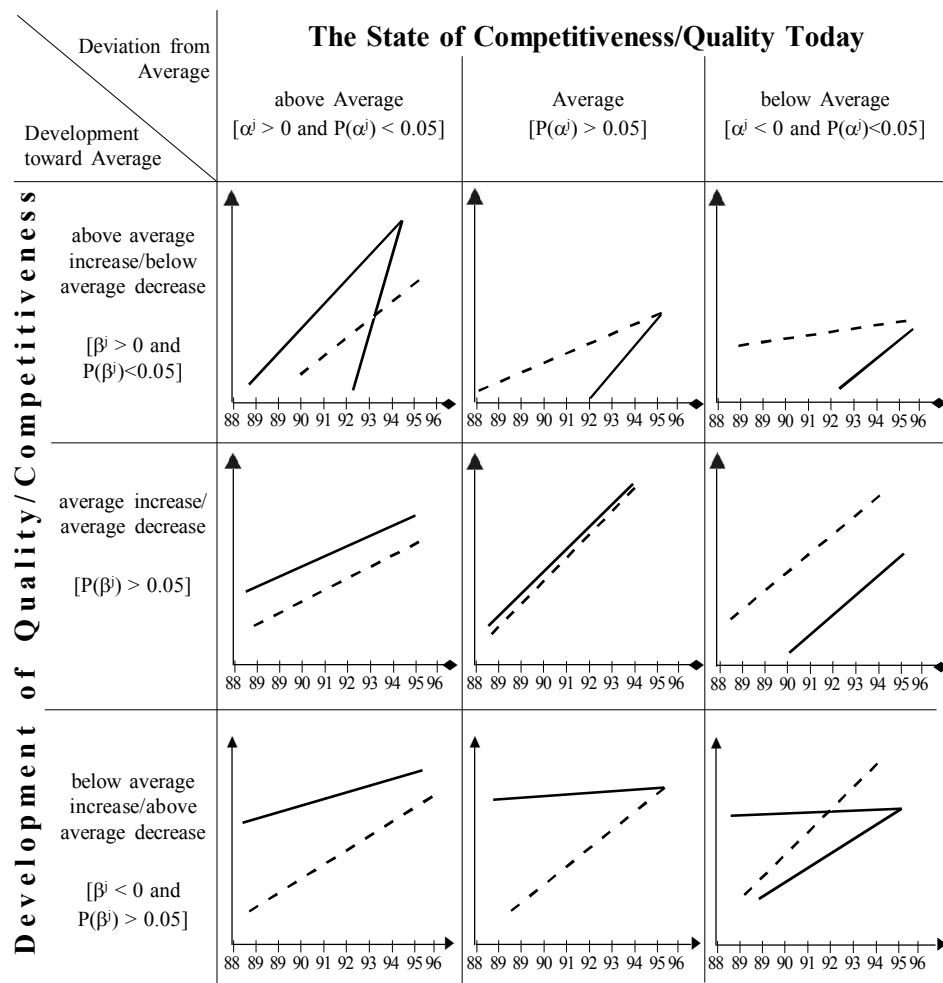
1. In case of heteroscedasticity the estimates of the standard errors are down- or up-ward biased. Statistical testing routines of t - and F -tests are no longer reliable, raising the problem of drawing misleading conclusions concerning the competitiveness and product quality of supplying countries. It is a good practice to apply testing routines like the Park Test (Park 1966), the Glejser Test (Glejser 1969) or the White's General Heteroscedasticity (White 1980) and use the robust or sand-

wich estimator of variance in case of heteroscedasticity.

2. Standard errors of OLS estimators underestimate the true standard errors in case of autocorrelation. The t - and F -tests are not generally reliable and particular regression coef-

ficients appear statistically significant, whereas in reality it might be not the case. To test for autocorrelation one should use Durbin-Watson or Cochran-Orcutt procedures (Gujarati 1998).

Figure 2. Regression Results and Development of the Unit Value/Competitiveness



Source: Cleff (2005) in *Interdisciplinary Management Research* edited by D. Barkovic and B. Runzheimer.

3. The inflation of the variance in case of multicollinearity leads to a fall in the precision on OLS estimators. Regression coefficients and their variances tend to be unstable. Sometimes even the signs for regression coefficients are estimated wrong. Again, that presents the problem of drawing misleading conclusions concerning the competitiveness and product quality of supplying countries. The coefficients and significance levels of the regression should therefore only be interpreted when the variance inflation factor (VIF) assumes a tolerable value.

Possible constellations between the state and the development of product quality supplied by a country are depicted in Figure 2 in the form of a portfolio. The annual average development of all countries is represented by a dotted line and, in an exemplary fashion, the development of an individual country by a solid line.

Competitiveness of Supplying Countries

The supplied product quality is only the first criterion for selecting a supplier country: the international competitiveness within a homogenous product group of the international product nomenclature provides us with another. The more a country succeeds in working out an export surplus within a group of homogeneous products in bilateral trade, the higher the estimated competitiveness will be (Grubel 1975). To measure competitive advantages

between two countries, the ratio of export surpluses to total trade volume (CA_{tik}) within a product group p should therefore be applied:

$$CA_{tik} = \frac{X_{tik} - m_{tik}}{X_{tik} + m_{tik}}$$

The variable x_{tik} stands for the export value from the supplier country k ($k \in \{1, \dots, n\}$) to the supplied countries i ($i \in \{1, \dots, m\}$) in a specific year t . The variable m_{tik} represents the respective import value. The chosen indicator as absolute competitive advantage corresponds to the objectives set out by a company when identifying potential supplier countries. The Revealed Comparative Advantage –RCA (Balassa 1965)– applied in the tradition of economics for determining comparative advantages, is considered to be a non-appropriate indicator in that case: if we assume for example that the RCA is defined as follows (Wolter 1977):

$$RCA_{tik} = \frac{X_{tik}}{m_{tik}} : \frac{X_{tik}}{M_{tik}}$$

with X_{tik} as total exports from country k to country i and M_{tik} as respective total imports. Then a positive absolute competitive advantage can be relatively hidden behind a low RCA if the ratio of exports to imports of a particular product group is indeed higher than 1, but the corresponding ratio in total trade turns out to be correspondingly higher. This can lead to an underestimation of the product-specific absolute competitiveness of nations, hav-

ing a high overall product export surplus, vice versa. For that reason purchasing departments will always focus on absolute competitive advantages of nations rather than Revealed Comparative Advantages (Porter 1986; Mucchielli 1987; Breuss 1997).

Analogous to the analysis of establishing the portfolio of quality, a portfolio of competitiveness with the different constellations between the current state and the development of the competitiveness of a supply country may be constructed. The variable CA_{tik} corresponds to the product specific degree of competitiveness of the supplier country k ($k = 1, \dots, n$) trading with the supplied country i ($i = 1, \dots, m$) for all $i \neq k$. Again, the regression reg^j is estimated separately for each given supplier country j ($j \in \{k=1, \dots, n\}$) and each regression reg^j includes all available bivariate trade data between every supplier countries ($k = 1, \dots, n$) and all supplied countries ($i = 1, \dots, m$).

$$\begin{aligned} \text{reg}^j: CA_{tik}^j &= \gamma^j + \alpha^j \cdot \text{supp}_{tik}^j + \\ &\quad \beta^j \cdot \text{supp_trd}_{tik}^j + \\ &\quad \delta^j \cdot \text{year_inv}_t^j + \varepsilon_{tik}^j \\ \text{supp}_{tik}^j &= \begin{cases} 1, & \text{if } k=j \\ 0, & \text{otherwise} \end{cases} \\ \text{supp_trd}_{tik}^j &= \text{year_inv}_t^j \cdot \text{supp}_{tik}^j \end{aligned}$$

Analogous to the portfolio of quality, the interpretation of the competition portfolio of competitiveness in Figure 2 thus arises. The deviation of an individual supplying country j ($j \in \{k=1, \dots, n\}$) from the annual aver-

age competitiveness in the final survey year can be read from the slope α^j and the respective significance level. There is an above (below) average competitiveness of a supplying country, if the coefficient α^j is significant [$P(\alpha^j) < 0.05$] and positive (negative). Otherwise, the competitiveness of the supplier country for the previous survey year is of average size. The competitiveness of the individual supplier country j generally increases (decreases) above (below) average over the whole period, if β^j is significantly positive (negative). Otherwise the trend of the competitiveness of a supplying country j develops within the annual average of all countries.

The estimations of indicators for product quality and competitiveness can be observed simultaneously, so that an evaluation of the individual supplier countries with regard to their competitiveness is made possible within the different quality standards. An example for such a portfolio will be shown in the next chapter.

Foreign Trade Statistics

For conducting the prior analysis, the EUROSTAT or the OECD foreign trade databases can be used. Foreign Trade Data are available from the OECD on the basis of the 6-digit product classification –the “Harmonized System.” The Harmonized System consists of three hierarchically ordered levels of product differentiation: HS2, HS4, and HS6. With the transition to the HS-System in 1988, a new revision

of the SITC (Standard International Trade Classification) was undertaken. The third SITC revision takes on the structure of the HS, so that the smallest structural units of the SITC are defined by the lower positions of the HS. Consequently, the HS-taxonomy turns out to be more differentiated than the traditional 5-digit SITC-Code (Rev. 3). The database includes all bilateral trade flows from each country in the world to each OECD-country, China, Taiwan, Hong Kong, for the years 1988-2005.

The European foreign trade statistics offer data on an 8-digit-aggregational level—the Combined Nomenclature. The Combined Nomenclature is based on the 6-digit Harmonized System, which was extended by 2 digits for the European Trade Statistic. Thus the first three levels of the Harmonized System HS2, HS4 and HS6 correspond to the Combined Nomenclature, completed by a further level KN8. These data are available for the years 1988 to 2005 and in contrast to the data of the OECD, only encompass the trade of individual EU states with all other states in the world. Therefore trade flows outside of the EU, such as those between Japan and the USA, are not determined.

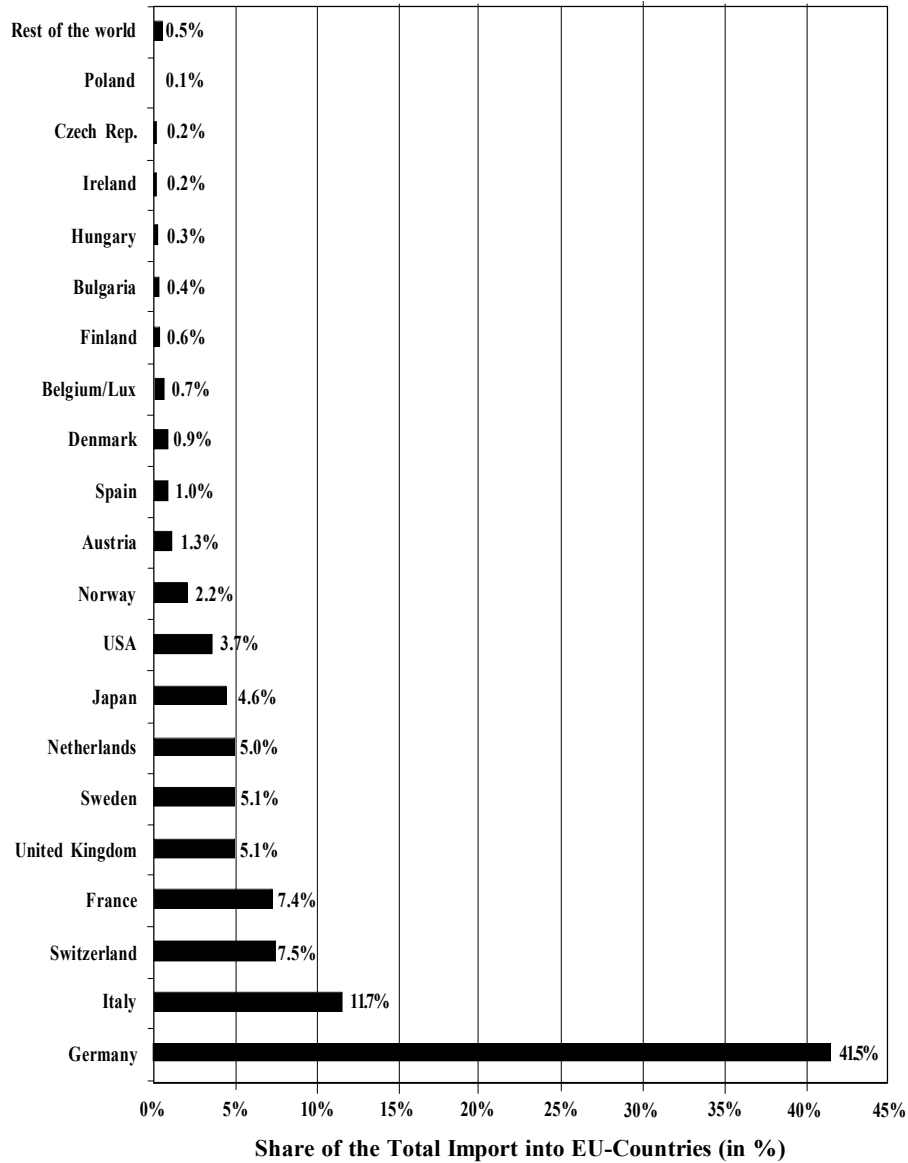
Both data sources therefore demonstrate differences in their differentiation according to products and the degree of bilateral trade flows ascertained between nations from varying regions. The use of both data sources should hence be conducted adequately to the problem: the European foreign

trade statistics should be given priority in the case of identifying countries with competitive supplies of certain products into the EU. As a result, the capacity to differentiate products traded is maximum. The statistics from the OECD, on the other hand, should be used when countries with a competitive supply of certain products are to be identified into other parts in the world. The capacity to differentiate between individual products is lower in this process than in the European Combined Nomenclature.

Practical Application of the Method

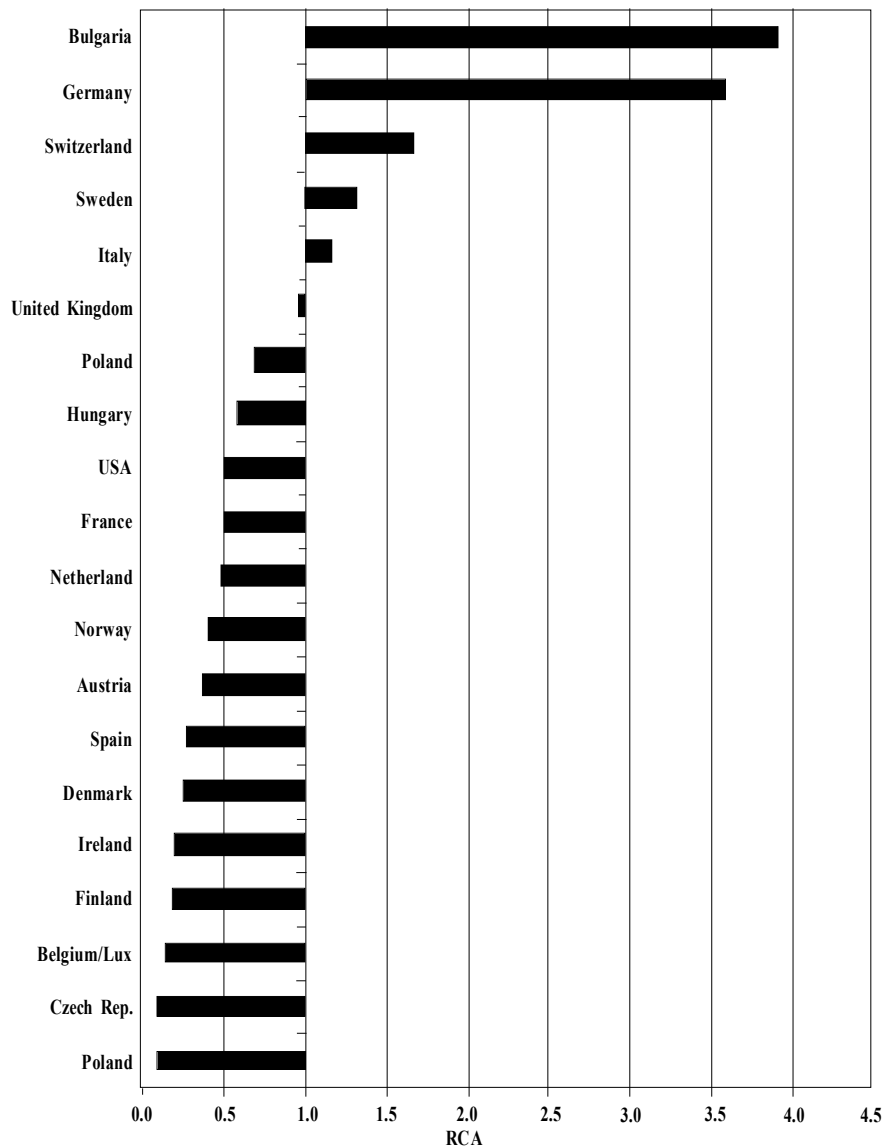
The choice of the database also depends on the differentiation and the range of products the procurement department of a company has to purchase. Within the context of a research project, products from the product list of the German mechanical engineering company *Heidelberger Druckmaschinen AG* were assigned to the 8-digit Combined Nomenclature. For 43 percent of the products, a direct allocation to the nomenclature of the EU-foreign trade statistics occurs without any problems. For a further 21 percent, allocations can approximately be made with products aggregated at a higher level. Although 36 percent of the products cannot be recorded with the help of the foreign trade statistics, these products partly involve activities performed by other firms, such as contract processing, which per definition cannot be included in the Combined

Figure 3. **Share of Total Imports of Linear-Acting Pneumatic Power Engines and Motors into the EU [Base-Unit: 1 000 ECU in 1997]**



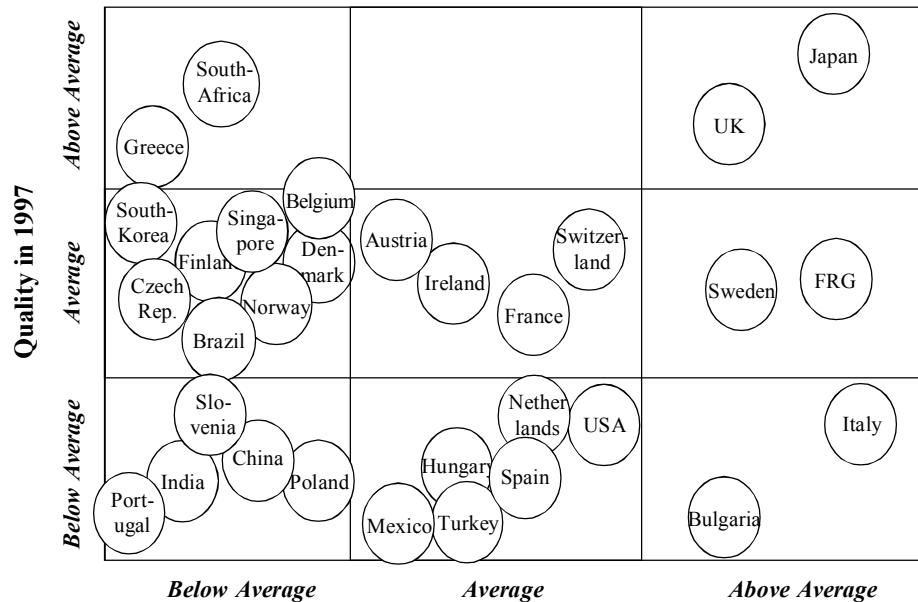
Source: Author's own calculations based on the EUROSTAT COMEXT database.

Figure 4. The RCA of different countries for Linear-Acting Pneumatic Power Engines and Motors [Base-Unit: 1 000 ECU in 1997]



Source: Author's own calculations based on the EUROSTAT COMEXT database

Figure 5. The Portfolio of Quality and Competitiveness



Source: Clegg (2005) in *Interdisciplinary Management Research* edited by D. Barkovic and B. Runzheimer.

Nomenclature, being built on physical products. The method is not applicable to nonphysical products. In summary, one may presume a very satisfactory allocation of the 8-digit nomenclature to an industrially widespread product list.

Using the example of the product “linear-acting pneumatic power engines and motors (Combined Nomenclature No: 84123190),” the method will be applied with the help of the European foreign trade database. The shares of individual supplier countries are depicted in Figure 3. Germany and Italy have the highest trade share totaling 53 percent, whereas Japan only achieves a share of 4.6 percent. Nevertheless, professional buyers with high

practical experience identify Japan as the nation with the most competitive suppliers for linear-acting pneumatic power engines and motors. The simple observation of market shares could only indicate the first beginnings for identifying competitive nations; as a valid indicator for the support of strategic company decisions, however, this remains too imprecise. The same is true for the specialization measure of the RCA already mentioned above and commonly applied amongst economists. Indeed, the specialization measures for Switzerland or Germany take on values higher than one. Other nations, which are regarded as competitive by professional buyers, such as Japan, achieve only low RCAs (see

Figure 4), because of their high overall product export surplus.

If one employs the above-described method for the cross-section of the absolute competitiveness and product quality, one arrives at the classification of countries seen in Figure 5. This classification corresponds to the estimations of quality standards and competitiveness made by professional buyers. However, the extent to which this method actually delivers valid results was reviewed according to a broad spectrum of products.

Validating the Method

Validating the empirical method requires detailed market knowledge concerning the respective products under investigation. Companies, which are at the beginning of a globalization process of their procurement activities and therefore have very little international experience, are generally less familiar with the international market on the buying-side. Then the validation of the method proves itself only some time after application. On the selling-side, market familiarity is more often pronounced. The validation of the method can also be reviewed on this side of the value chain.

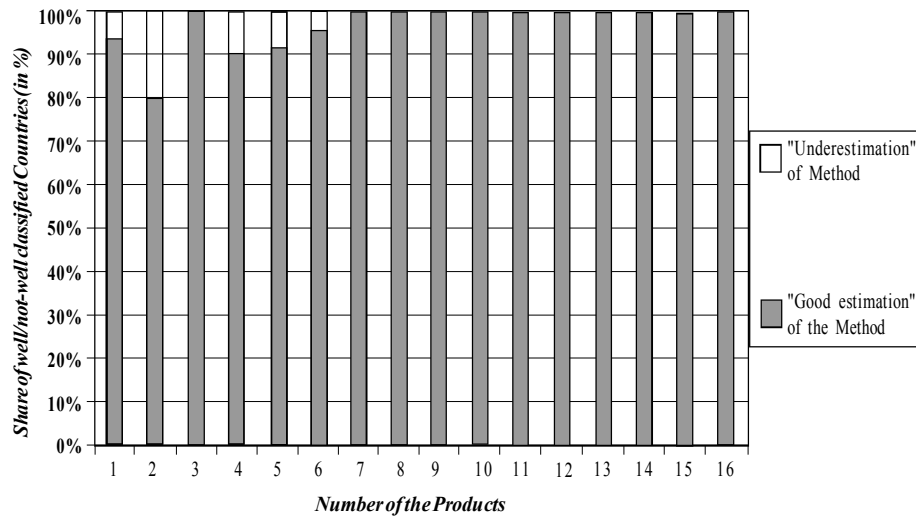
The method was validated for 16 internationally known procurement and sales products of the German company *Heidelberger Druckmaschinen AG*. The following illustrations delineate the comparison between the market knowledge of professional buyers or marketing experts of the

Heidelberger Druckmaschinen AG and the empirical results of the statistical method.

A total of 11 out of 16 products indicates no difference! The method correctly classifies all countries into the three competitive-classes (below average competitiveness, average competitiveness and above average competitiveness). With a further four out of the 16 products differs for only one country classification. The *Heidelberger Druckmaschinen AG* classification of this different classified supplier country turns out to be better than that of the statistical method, which can partly be explained by the existing or traditional procurement structures of the company: the evaluators try to make their own actions plausible by orienting their evaluations whether consciously or unconsciously according to the existing or traditional purchasing structures. The classification of competitiveness of the professional buyers orients itself according to current procurement structures, which at the *Heidelberg Druckmaschinen AG* are primarily focused on the German market. It becomes quite visible that hardly any deviations occur between the high professional market familiarity and statistical method when classifying the competitiveness of the supplier countries.

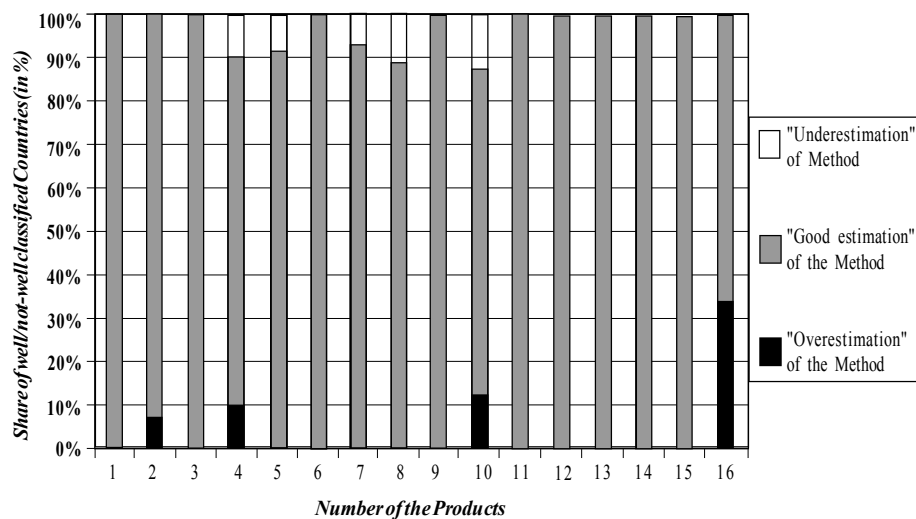
The influence of traditional procurement structures is especially strong when estimating product quality standards. Indeed, in more than half of the product groups (nine products), the quality standards are classified identi-

Figure 6. Evaluation of the Country Competitiveness for 16 Products: Comparison of Results between the Method Applied and Estimations made by the *Heidelberger Druckmaschinen AG*



Source: Cleff (2005) in *Interdisciplinary Management Research* edited by D. Barkovic and B. Runzheimer.

Figure 7. Evaluation of the Country-Quality-Standards for 16 Products: Comparison of Results between the Method Applied and Estimations made by the *Heidelberger Druckmaschinen AG*



Source: Cleff (2005) in *Interdisciplinary Management Research* edited by D. Barkovic and B. Runzheimer.

cally. For three out of the 16 product groups, the quality standard approximated by the *Heidelberger Druckmaschinen AG* and the one ascertained by the statistical method differ only for the supplier country Germany. The buyers of the *Heidelberger Druckmaschinen AG* systematically assume the quality standard of German products to be higher. Again, it seems that the classification of quality of the professional buyers orients itself according to current procurement structures, which are focused on the German market.

For a further two out of the 16 products, next to a higher classification of German product quality, another country is identified in a different class as in the statistical method. If one refrains from considering traditional procurement structures attributed to the “Germany-Bias,” equal classifications for 12 out of 16 products arise when they are estimated according to the professional buyers and the statistical method.

Summary

The large German share in foreign trade now already earmarks the far-reaching integration of German companies within the world economy. Companies respond to the globalization of markets by internationalizing their own activities and aligning company strategies according to international competition. The German home market no longer makes up the decisive and exclusive benchmark of stra-

tegic considerations, meaning that even procurement strategies –and here especially the regional configuration of the suppliers– are increasingly being checked. The multitude of options, which may exist within the context of a global procurement strategy, can only be optimally utilized when the processing and provision of information as well as the construction of decision models support the conception of various strategies.

Decision models known from literatures, which are based solely on information about the individual suppliers at company-level, are only feasible when a manageable number of potential suppliers exists worldwide. This, however, should be more of an exception than a rule. In the regular scenario, the reduction has to comprise the use of data on the national level.

In cooperation with the German mechanical engineering company *Heidelberger Druckmaschinen AG*, an attempt is therefore made to develop and validate a simple regression based method for pre-selecting possible supplier countries. It is possible to close the gap between economic data and company information and to systematically reduce the multitude of options to a manageable quantity of potential supplier countries. For the product “pneumatic power engines,” for example, the number of potential countries can be reduced to two countries having a high competitiveness and a high product standard: Japan and United Kingdom.

The method is successfully validated with the help of professionals market knowledge of the *Heidelberger Druckmaschinen AG*. Divergence between the statistical result and the estimation of the experts from the *Heidelberger Druckmaschinen AG* appears almost exclusively when evaluating the quality standards within German production. This “Germany-Bias” probably explains itself, in particular, from the *Heidelberger Druckmaschinen AG* supplier structure focusing on the German Market. Consequently, with regard to internationalizing procurement activities, this sta-

tistical method acts as a spotter for the company.

Despite the high validity of the method, attention must be drawn at this point to the shortcomings of such an approach. With respect to free trade, defining competitiveness over trade advantages would very much turn out to be fruitful. Trade barriers to tariffs and non-tariffs tend to bias results: The country competitiveness apparently rises with the extent of the trade barriers (Breuss 1997). The results of this method should therefore only be interpreted when one is aware of the corresponding trade restrictions.

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